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Original Research Article

Descriptive audit of maternal sepsis in a tertiary care centre of North India

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ABSTRACT

Background: Maternal sepsis is one of the leading causes of maternal mortality around the world. The aim of this study was to study the prevalence, clinical profile and fetomaternal outcome of maternal sepsis at a dedicated Obstetric critical care unit of a tertiary care centre of North India. It was retrospective study conducted in tertiary care centre in North India

Methods: Women diagnosed as sepsis or septic shock at any point in pregnancy and up to 6 weeks postpartum (irrespective of the source of infection) were included in the study. Demographic, clinical, microbiological and outcome data were recorded from the case sheets of all patients admitted in obstetrical critical care unit between January to December 2016. Outcome measures: Prevalence, bacterial organism, source of infection, mode of delivery, period of gestation, maternal and fetal outcome.

Results: The prevalence of maternal sepsis was 16.5/10,000 live births. The number of maternal deaths attributable to sepsis were 35, making the maternal mortality ratio due to sepsis 128/100,000 live births. 87% of the cases were unbooked. 22% presented antenatally while 58% were postpartum and 20% were postabortal. Genital tract infection was most common source of infection. *E. coli* was the predominant organism in 28% followed by Methicillin resistant *staphylococcus aureus* in 12%. The mortality from sepsis was very high (78%). 54% of cases required mechanical ventilation and around 7% had to be shifted to intensive care unit for advanced life support and care. Sepsis was associated with preterm delivery and a high perinatal mortality rate.

Conclusions: Early recognition of the severity of infection and prompt management by a multidisciplinary team of intensivists, anesthetists, neonatologists, obstetrician, midwives are the key to success. Vigilant infection control measures must be strictly practiced during all pregnancy events.

Keywords: Fetomaternal outcome, Maternal mortality, Maternal sepsis

INTRODUCTION

Maternal sepsis is a leading cause of preventable maternal morbidity and mortality in our country. Mostly, it is due to peripartum factors and the instigating organisms are usually from the polymicrobial flora of the genitourinary tract.¹ However, non-obstetric infections that may get aggravated due to physiological alterations

in pregnancy, also make a significant contribution to morbidity due to infectious etiologies in pregnancy.

The majority of the cases of sepsis present within 24-48 hours of delivery, abortion, or rupture of membranes.² The expeditious recognition of maternal sepsis and meticulous and appropriate management can prevent the progression to severe sepsis and septic shock.

Studies from developed countries report maternal mortality ratio from sepsis to be 1.13/100,000.³ In these countries, maternal sepsis is usually the result of puerperal sepsis and urinary tract infections.⁴

Little is known about the epidemiology, etiology, incidence of severe maternal morbidity related to sepsis and outcome of maternal sepsis in low-income countries like India. A significant number of maternal deaths are expected to be associated with risk factors due to poverty such as delivery without a trained birth assistant, lack of accessibility to healthcare facilities etc.^{5,6}

The overall risk of mortality and morbidity from maternal sepsis can be reduced by improving maternal and child care services. In view of the increasing rates and severity of sepsis worldwide and limited data from developing countries like ours, we planned this study to find out the clinical profile and fetomaternal outcome of maternal sepsis at a dedicated obstetric critical care unit of a tertiary care centre in India.

METHODS

This retrospective observational study was done at Department of Obstetrics and Gynecology, VMMC and Safdarjung Hospital, New Delhi. VMMC and Safdarjung Hospital is a tertiary care hospital located in the capital of India. More than 25,000 deliveries occur annually, which is highest in any single hospital in India. Recently, a dedicated obstetrical critical care unit with state of art ventilators and modern equipments was started here and it is the first of its kind in any government hospital in Northern India. Case record sheets of all patients admitted in obstetrical critical care unit between January 2016 to December 2016 were studied and findings were recorded in a predesigned performa. The study was approved by Institutional ethics committee.

Pregnant women diagnosed as sepsis or septic shock at any point in pregnancy and up to 6 weeks postpartum (irrespective of the source of infection) were included in the study. The clinical diagnosis of sepsis was made when following occurred at two occasions at least 4 hours apart: temperature $>38^{\circ}\text{C}$ or $<36^{\circ}\text{C}$, Heart rate ≥ 100 beats/min, respiratory rate ≥ 20 /min, WBC $>17 \times 10^9/\text{l}$ or $<4 \times 10^9/\text{l}$ or $>10\%$ immature BF. Besides, patients who died due to infection or suspected infection or required level 2 or level 3 critical care with suspected severe sepsis were also included.

The clinico-demographic, microbiological and outcome data were recorded from the patient's case sheet. Obstetric information recorded included parity, booking status, gestation or postpartum day at time of sepsis, mode of delivery and gestation at that time, place of delivery, history of prior antibiotic treatment. Outcome data recorded included maternal admission to an Intensive care unit, gestation at time of delivery, mode of delivery, infectious complications and maternal, fetal or

early neonatal death. Evidence of fetal infection in cases of miscarriage, stillbirth, early neonatal death and preterm birth was determined based on clinical, microbiological and histological findings.

RESULTS

General considerations

During the study period, 719 patients were admitted in the obstetrical critical care unit, of which 45 patients had fulfilled the criteria of sepsis and were included in the study. General characteristics of the patients included in the study are given in Table 1.

Table 1: General characteristics of the patients admitted with sepsis in obstetrical critical care unit.

Characteristics of the patients	Value
Age of the patient (in years)	
Less than 20 years	31%
20-35 years	09%
More than 35 years	60%
Parity	
1	40%
2	33%
3 or more	27%
Booking status	
Registered	11%
Booked	02%
Unbooked	87%
Antecedent pregnancy event	
Antenatal	22%
Postnatal	58%
Postabortal	20%
Place of delivery	
Home	20%
Outside	51%
In hospital	19%
History of prior antibiotic treatment	
Yes	66%
No	34%

The total number of live births over the study period was 27,202. The prevalence of maternal sepsis was 16.5/10,000 live births. The number of maternal deaths attributable to sepsis was 35, making the maternal mortality ratio of 128/100,000 live births.

Of the 45 cases of maternal sepsis, 26 were postnatal women. Among them, 12 had a normal vaginal delivery while 14 had a cesarean section. All except 2 had an emergency cesarean section. 20% of the patients of maternal sepsis were post-abortal and all of them were induced abortions and referred by other hospitals/maternity centers. 20% of the patients had history of home delivery while 51% had delivered at maternity centers other than our hospital. All the patients who had been referred to our centre had already received antibiotic

treatment. 35% had not received any antibiotics till the time of admission in obstetrical care unit. 60% of the cases presented within 7 days of delivery while 11% presented after 10th postpartum day.

Risk factors

Age emerged as an important risk factor for maternal sepsis as 60% of patients belonged to age group more than 35 years. Booking status of the mother was also important risk factor as approximately 90% of the cases of sepsis were unbooked at the time of presentation.

Spectrum of Infection and causative organism

Genital tract infection was present in 51% of the women with sepsis. This was followed by chest infection (25%), wound infection (7%), urinary tract infection (5%) while in 6% of the patients, the site of infection remained undiagnosed.

E. coli was identified in 28% of the cases followed by MRSA in 12%, streptococcus in 7% of the cases. No microorganisms could be isolated in 40% of the patients.

Outcome

The mortality from sepsis was very high (80% which is 35 out of 45 cases). 54% of cases required mechanical ventilation and around 7% were shifted from the critical care unit to intensive care unit for advanced life support and care. The duration of hospital stay was less than 48 hours in 42% of the cases. One out of ten cases stayed for more than 7 days.

An obstetrical procedure had to be performed in 13% of the cases. Repeat laparotomy was required in 3 out of 45 patients for pyoperitoneum drainage with bowel repair while hysterectomy was done for secondary postpartum hemorrhage in 1 patient. Uterine curettage was done in two cases for removal of infected retained products of conception.

One-third of the patients had multiorgan failure and while pulmonary edema occurred in 24% of the patients. 33% of the cases were in disseminated intravascular coagulation and around 38% had acute renal failure.

On death review of maternal death due to sepsis, delay in seeking timely help was found in 42% of the cases while 38% were referred after significant delay to our tertiary care centre. In 20% of the cases delay was found in obtaining legal abortion.

DISCUSSION

Sepsis is a life-threatening condition in which there is organ dysfunction due to infection. Septic shock is a subset of sepsis in which there is profound circulatory, cellular, and metabolic abnormalities. Patients with septic

shock can be clinically identified low blood pressure with requirement of vasopressors to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L (>18 mg/dL) in the absence of hypovolemia. This combination is associated with hospital mortality rates greater than 40%.¹

Sepsis in obstetrical cases can be directly pregnancy-related or as a condition aggravated by normal pregnancy physiology, which ultimately have the potential to progress to severe sepsis and septic shock. The focus of sepsis can vary according to the stage of pregnancy and includes genital tract sepsis (which may extend from cervicitis and endometritis through to pelvic thrombophlebitis and peritonitis), urosepsis, surgical site infection, pneumonia, empyema and mastitis.²

The prevalence of maternal sepsis was estimated to be 16.5/10,000 live births consistent with reported rates of 0.1–0.3% for developed countries.⁷⁻¹⁰

Sepsis has a very high fatality rate among obstetric patients. Puerperal sepsis is a major cause of maternal mortality (31.5%). Unbooked status and unsupervised delivery is an important risk factor for the development of maternal sepsis. Genital tract infection and chest infection are the most common causes of infection. Emergency cesarean section carries a significant risk for the development of sepsis. *E. coli* and MRSA infection account for the majority of sepsis cases. The finding that maternal sepsis progressed in 60% of the cases who had already been started on antibiotics highlights the complexity involved in the management of sepsis patients.

The altered maternal physiology due to pregnancy and sepsis does affect the pharmacokinetics and pharmacodynamics of drugs. The standard antibiotics may be inappropriate and inadequate for this population requiring apt knowledge and expertise before prescription in order to prevent antibiotic resistance due to irrational use. Furthermore, simply prescribing antibiotics alone would not serve any purpose unless adequate follow up is ensured to find out the effectiveness of the treatment prescribed.

Delay in referral to tertiary care level was found in 38% of the patients. This reflects upon the fact that most of the patients initially present to the primary care general practitioners or emergency medical team who may be less aware of the sign and symptoms of sepsis or even the rapidity of progression of sepsis. Most patients presented within 7 days of delivery however they were already in a state of irreversible damage. Hence it is the need of the hour to sensitize the general practitioners and emergency team about maternal sepsis and encourage them to have a low threshold for referral to tertiary care centre without any delay.

The increased rate of maternal sepsis associated with emergency cesarean section highlights the need for antibiotic prophylaxis within 60 minutes before cesarean section. Furthermore, stringent infection control measures must be followed at all the steps of care of this population.

Results of the present study must be interpreted in the light of several limitations. First, it is a retrospective study and the data collected is too small to generalize the results for larger population. Second, in the absence of data for control groups it is not possible to comment on the temporality of factors like mode of delivery, age, and parity with respect to development or progression of sepsis.

The results of the study have significant implications for health care delivery system in India. In view of the high prevalence of maternal sepsis in our centre and a very high case fatality rate, there is need for development of national guidelines for prevention and management of maternal sepsis in our country. Institutional delivery should be promoted in order to prevent and promptly manage any complication of labour and delivery. Intensive care and monitoring is required for cases of maternal sepsis. Hence it is imperative to train the primary care practitioners to recognize the sign and symptoms of sepsis and have a low threshold for transfer to tertiary care level. At all levels of care, the government should look into the measures to prevent the overcrowding and increase the doctor:patient and nurse:patient ratio to provide quality care..

CONCLUSION

Maternal sepsis is a preventable cause of maternal morbidity and mortality. Early recognition of the severity of infection and institution of effective maternal resuscitation by a multidisciplinary team of intensivists, anaesthetists, neonatologists, obstetrician, midwives are the key to success.

Primary care practitioners should have a low threshold for referral of women in pregnancy with signs of infection. Improving antenatal care, increasing the number of booked patients, selection of high risk cases for mandatory hospital delivery and timely referrals are some of the steps to improve the outcome. Vigilant infection control measures must be strictly practiced during all pregnancy events.

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